

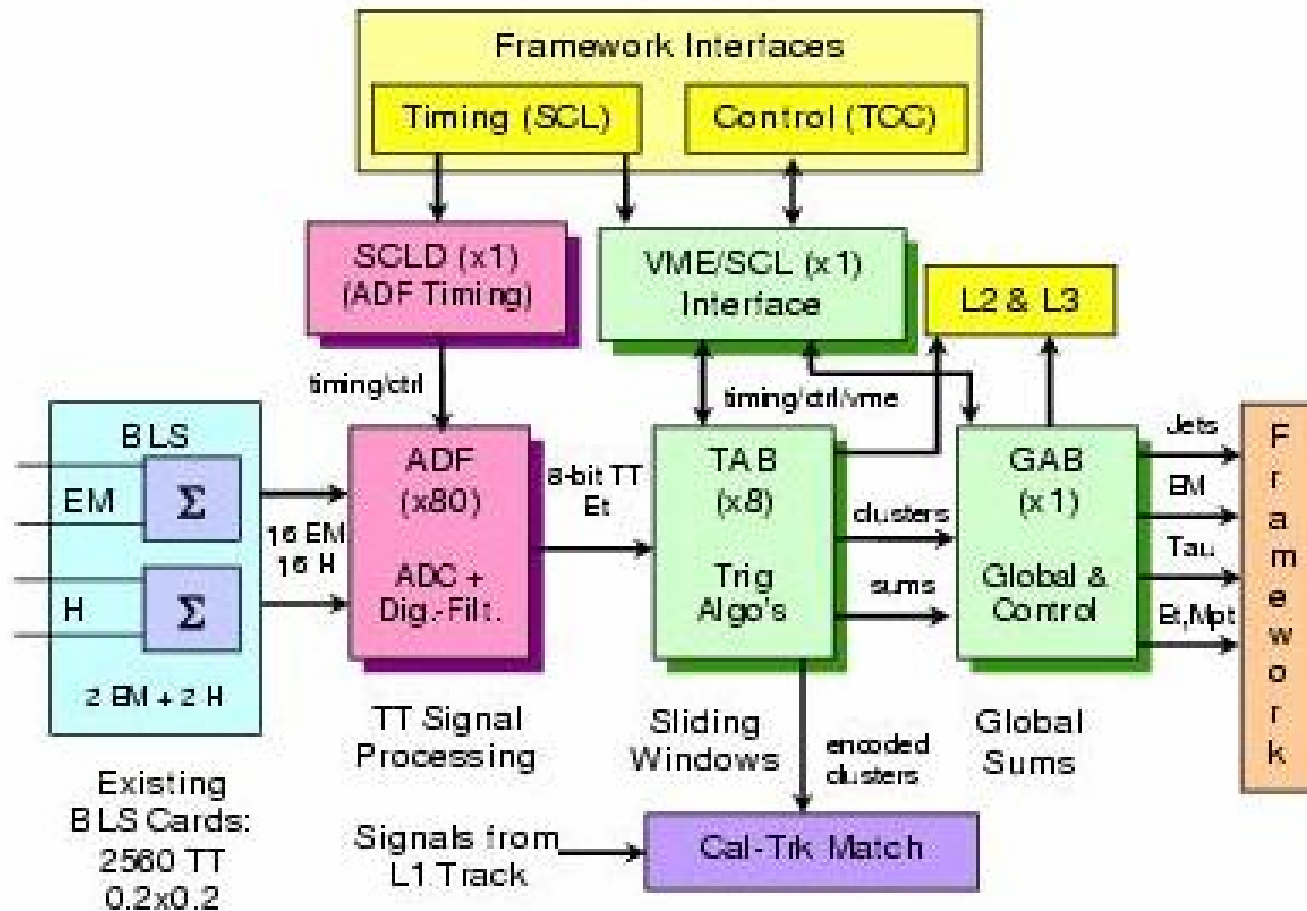


Installing and Commissioning the L1Cal Trigger

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L1Cal Upgrade Overview





Opening Volley

- One can argue that the L1Cal trigger upgrade is the most critical upgrade to the experiment
 - ♦ It is completely new, technically complicated, and extensive
- Run "2a" experience
 - ♦ All trigger systems were fully commissioned late
 - ♦ Some trigger systems were very late
 - ♦ Some are still not yet commissioned
- How can the L1Cal trigger upgrade avoid a long commissioning time during running?
 - ♦ History says it can't



Installation and Commissioning Steps

- Step A - Bench testing
- Step B - Pre-commissioning using preproduction electronics in Test Area
- Step C - Pre-commissioning using production electronics in Test Area
- Step D - Installation in MCH1
- Step E - Commissioning with beam
 - ♦ If L1Cal is to be commissioned quickly after the 2005 shutdown (Step E), extensive hardware and software work must occur in Steps B and C



Task Lists and Effort

- Task list comes from the L1Cal group
- Duration and effort required comes from SC-IPC working group
 - ♦ Feedback needed from L1Cal
- Iteration with L1Cal group and some additional task details needed



Pre-Commissioning Tasks

Task	Duration	FTE
Data acquisition in test area	12 mo	3
Downloading software	3 mo	1
Online monitoring	6 mo	1
Parameter determination	6 mo	1
Integration with TF	1 mo	1
Unpacking/Reco/ Examine software	12 mo	2
Simulation tasks	12 mo	1
Develop L1 physics triggers	6 mo	1



Pre-Commissioning Tasks

Task	Duration	FTE
Develop L2 and L3 triggers	12 mo	2
Splitter data analysis	3 mo	1
Digital filter studies	12 mo	1
Sliding window algorithm studies	6 mo	1
Rate and efficiency estimates	3 mo	1



Installation Tasks

Task	Duration	FTE
Continue pre-commissioning tasks	12 wk	4
Remove old racks	1 wk	4
Redress cables	2 wk	4
Install new racks	1 wk	4
Connect new rack services	1 wk	2
Connect BLS and intermediate cables	2 wk	4
Beam-off commissioning	5 wk	6

6/8/2004

Some D0 meeting



Commissioning Tasks

Task	Duration	FTE
Finish various pre-commissioning tasks	6 mo	4
Noise studies	3 mo	2
Data / MC comparisons	6 mo	2
Tune parameters	3 mo	2
Determine reference sets	3 mo	1
Understand missing Et	6 mo	1
Implement / study physics triggers	6 mo	4



Task Summary

- As an example, current STT commissioning involves ~ 5 FTE's (postdocs plus students)
 - ♦ Much shorter post-shutdown commissioning time required for L1Cal (loss of physics)
- Rough estimate for postdocs plus student FTE's for all tasks is ~12 from 8/2004 - 2/2006
 - ♦ Cannot necessarily count current group (since they are finishing the hardware)
 - ♦ Diminishing Saclay participation



Two Cent Suggestions

- The present group, while excellent, is too small and needs to be enlarged by the start of the 2004 shutdown
- It is critical that the group find 4-5 new postdocs/grad students who will become involved at the earliest commissioning stages and remain with the project until it is complete
 - ♦ Commissioning, not hardware, is their top responsibility
 - ♦ Short term rotations don't work
- 16 hour data-taking shifts should be started early on
 - ♦ Keeps pressure on to find/solve problems
 - ♦ Partially filled by the DØ shift pool?



Two Cent Suggestions

- Important to bring new groups/people in now, not a year from now (avoids "you can't do this because it would take too long to get up to speed")
- Early milestones should be set with the penalty of direct intervention should they be missed
 - ♦ Critical (and difficult) to monitor progress during the pre-commissioning period
- Form a separate L1Cal commissioning group
- Offer to support L1Cal faculty at Fermilab for a semester



Conclusions

- The L1Cal trigger upgrade is the most critical upgrade to the experiment
- In order to avoid a lengthy (~1 year) commissioning period
 - ♦ Most of the hardware debugging, system integration, and software coding must be completed during the pre-commissioning period to avoid wasting a year of post-shutdown physics data
 - ♦ The manpower to complete these tasks is presently **NOT** there (in our opinion)
 - ♦ The experiment must make finding new groups/people a high priority



Installation and Commissioning Steps

- Step A (Bench testing)
 - ♦ Will assume hardware deliverables and bench testing follows the current schedule
 - ♦ An important milestone to watch is the start date of ADF production in Fall 2004



Installation and Commissioning Steps

- Step B (Pre-commissioning using preproduction electronics in Test Area)
 - ♦ Use splitter signals (currently 4x2) from BLS sent to Test Area located outside MCH1
 - ♦ Can also use TWG (Test Waveform Generator)
 - ♦ Goals
 - Verify operation of preproduction cards
 - Begin hardware and software integration into experiment (L1, L2, L3)
 - Begin digital filter, trigger, rate, noise studies
 - Begin building infrastructure (populated racks) that will eventually move into MCH1



Installation and Commissioning Steps

- Step B (Preproduction testing and integration in Test Area)
 - ◆ This step requires v.2 ADF (8/04)
 - ◆ This step requires additional manpower for integration (integration into DAQ, data collection, data analysis, ...)
 - ◆ This step requires additional manpower for software (calibration, downloading, control, monitoring, alarms, offline)



Installation and Commissioning Steps

- Step C (Pre-commissioning using production electronics in Test Area)
 - ◆ Use additional splitter signals (4x4x2) from BLS sent to Test Area located outside MCH1
 - Sliding windows algorithms must be tested by other means
 - ◆ Goals
 - Verify operation of production cards
 - Complete hardware and software integration into experiment
 - Complete infrastructure (fully populated racks) that will eventually move into MCH1
 - Complete digital filter, trigger, rate, noise studies



Installation and Commissioning Steps

- Step D (Installation in MCH1)
 - ♦ Remove racks/hardware in MCH1 and replace with racks/hardware in Test Area during 2005 ~12w shutdown
 - ♦ Big cabling job
 - ♦ Significant tech support required for service installation (double shifts)
 - ♦ UIC responsibility



Installation and Commissioning Steps

- Step E (Final commissioning)
 - ♦ Intensive period of understanding the new L1Cal trigger
 - Noise studies
 - Tuning of digital filter coefficients
 - Determination of threshold reference sets
 - Understanding data collected with new L1Cal and L1CalTrack triggers
 - Understanding missing E_t
 - Return to data-taking with high efficiency



Additional Work

- Other areas that are important to successful and timely commissioning
 - ♦ L1Cal simulation leading to AND/OR terms (Northeastern)
 - ♦ D0Sim of ADF
 - ♦ Offline software
 - Easy access to L1Cal, precision readout, D0Reco variables in one root-tuple
 - ♦ L2Cal??